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AUTHOR Legum, Stanley E.
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ABSTRACT

Six groups of third-grade boys--three predominantly black, three white--were tested to explore three questions: whether visibility or proximity of microphones affects speech production; whether stereo recordings made from desk or wall-mounted microphones are as usable for linguistic analysis as monoaural recordings made from lavaliere microphones; and whether ethnic groups react differently to the recording situation. In each school, one group was recorded on lavaliere microphones; one by visible wall microphones, and one by hidden wall microphones. A panel of linguists reviewed the recordings and found no significant difference in the amount of casual speech produced, and no differences between blacks and whites. (SK)

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MONOAURAL-STEREO RECORDING COMPARISON

Stanley E. Legum

ABSTRACT

The following three questions are addressed and answered (with qualifications) in the negative:

1. Does the visibility or proximity of microphones affect the speech production of elementary school children?
2. Are stereophonic recordings made from desk or wall mounted microphones as usable for the purposes of linguistic analysis as monoaural recordings made from lavaliere microphones?
3. Do different ethnic groups react differently to the recording situation?

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IR 002 324

MONOAURAL-STEREO RECORDING COMPARISON

In a previous study by Williams and Legum (1970) a technique of recording the informal speech of elementary school children was developed. It was found that the presence of an adult among a group of children inhibited the production of casual speech, but that large amounts of casual speech could be recorded by simply placing lavaliere microphones on children and leaving a group of them together with no overt adult supervision. The lavaliere microphones and cords did not seem to constrain the range of topics or cause the children to use noncasual speech patterns.[1] It is possible, however, that children recorded in a similar manner, but with more distantly placed microphones, might be even more at ease. Hence we are led to the question: Does the visibility or proximity of microphones affect the speech production of elementary school children?

Since the purpose of the recordings is to enable the linguistic analysis of the speech of the children, the technical quality of the recordings becomes an important question. It is a well known fact that the use of wall or desk mounted microphones has the advantage of avoiding cord noises which occur when a speaker wearing a lavaliere microphone moves. Unfortunately, wall and desk mounted microphones

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[1]Comments on the interview situation such as "I'm the broadcast man." or "Hey, I'm on Candid Camera." occurred in most groups. Comments such as "That man could be listening to us." were generally discussed energetically for a brief period and then ignored. Numerous discussions of television programs were recorded.

are generally farther from the speaker's mouth than are lavaliere microphones and thus have the disadvantage of picking up more background noise. This disadvantage can, in part, be offset by using stereophonic recording equipment. A further complication with nonlavaliere recordings is the necessity of identifying each speaker from a shared recording rather than having each speaker uniquely associated with a single audio track on which his voice is by far the loudest and clearest. It has been claimed that this problem is compensated in stereo recordings by the reproduction of spatial perceptions allowing the listener to place the speakers relative to one another. Hence the question arises: Are stereophonic recordings made from desk or wall mounted microphones as useable for the purposes of linguistic analysis as monoaural recordings made from lavaliere microphones?

Future studies will compare the speech of Black and White children collected under identical conditions. For this reason it is prudent to ask: Do different ethnic groups react differentially to the recording situation?

Procedures

Three groups of third grade Black boys were chosen from a predominantly Black elementary school in Los Angeles serving a population which can be roughly classified as upper-lower class. Three groups of third grade White boys were chosen from a predominantly White elementary school serving a population which can be roughly classified as lower-middle class. The schools were approximately five miles apart. Each group of Black children and two of the groups of White children consisted of six boys who were chosen by having the teacher choose a boy she believed to be of low socioeconomic standing and then allowing that

boy to choose five of his classmates. The third group of White children was drawn from the same class as one of the other groups and consisted of the five remaining boys who were present who had not been previously interviewed. All of the other groups were from different classrooms. Two of the groups from the predominantly White school contained one Mexican-American child and one group contained a child of Cuban extraction. One of the groups from the predominantly Black school contained two Mexican-American children and the other two groups were composed entirely of Black children.

One group from each school was assigned to each of the three recording conditions:

a. Children wore lavaliere microphones and were recorded both from the lavaliere microphones and hidden wall microphones.

b. Children were recorded by wall mounted microphones which were in plain sight.

c. Children were recorded by hidden wall mounted microphones.

The children were brought into the recording area which was inside a converted delivery van and had all the recording devices except a small fixed camera and the microphones (as specified above) out of sight.[2] In condition (a) the children were seated, the microphones were placed on them and they were asked their names, ages, and birthdates. Meanwhile a technician in the rear compartment of

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[2]For a detailed description of the recording area see Figure 1, p. 17 of Williams, C. E., & Legum, S. E., On recording samples of informal speech from elementary school children. Technical Report No. 25, 1970, Southwest Regional Laboratory, The only difference is that the table used in the earlier study was not included in the current study.

the van started the recorders and adjusted the recording levels appropriately. In conditions (b) and (c) the children were simply seated and asked to give their names, ages, and birthdates. Next the interviewer explained that he was going to administer a test but that it was necessary for him to go and obtain it. The children were told that they could talk as much as they liked, and told not to move around. The interviewer left and returned 45 minutes later with a short test. After taking the test, the children were returned to their classes.

Results

A panel of linguists, viewed the six video tapes and decided that:

a) Each of the three recording conditions elicited approximately equal amounts of casual speech from each group at each school.[3] It is possible that groups having no microphones in sight were slightly more relaxed than the others and that groups which found the wall microphones (and did not have the lavaliere microphones placed on them by the interviewer) exhibited somewhat more overt concern with regards to their situation than the other groups. These effects do not appear to have a significant effect on the quality of speech production. All groups except one (which did not notice the camera) spent a great deal of time discussing the possibility that they were being recorded.

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[3]Exact word counts are not available, but it is clear that the amount of speech produced did not differ markedly between groups.

b) There are no major racial differences among Black and White speakers' overt reactions to the recording condition. In particular, approximately equal amounts of casual speech were produced by each group regardless of race.[3]

Three phonological variables of high frequency were chosen for the test of recording quality: (th)--spelled th and pronounced /θ/ or /ð/ in standard English; (KD)--final consonant clusters whose second member is /t/ or /d/ in standard English; and (VD)--final /t/ or /d/ when immediately preceded by a vowel. The first hundred of each of these variables were identified on the transcript of one of the boys from the Black group which had been recorded in both mono and stereo. The specific pronunciation of each of these instances was then transcribed (when possible) using the stereo recording. The specific pronunciations were then transcribed using the monoaural recordings. The points of agreement and disagreement using the two recordings were noted (see Table 1).

TABLE 1

COMPARISON OF THE FIRST 100 INSTANCES OF EACH OF THREE VARIABLES TRANSCRIBED FROM MONOAURAL AND STEREO RECORDINGS

	(th)	(KD)	(VD)	Overall	Percentages overall
Agreements between stereo and monoaural transcriptions	58	69	68	195	65%
Disagreements between stereo and monoaural transcriptions	42	31	32	105	35%
Totals	100	100	100	300	100%

The overall disagreement rate of 35% warrants further investigation. We must ask:

1) Are the disagreements due to greater clarity of one recording-playback system over another, or
2) Are some of the disagreements due to inherent audio reproduction properties of the two recording-playback systems such that one system is preferable for recording and transcribing some sounds and the other system is preferable for recording and transcribing other sounds?

These questions can be answered by looking at the nature of the disagreements. For each of the three linguistic variables the greatest number of disagreements were found among instances which were coded as "nontranscribable" on the stereo recording and subsequently coded as one or another specific phonetic realization from the monoaural recording. By contrast, relatively few items were not transcribable on the monoaural recording which were transcribable on the stereo recording (see Table 2).

TABLE 2

DISTRIBUTION OF DISAGREEMENTS BETWEEN STEREO AND MONOAURAL TRANSCRIPTIONS

	(th)	(KD)	(VD)	Overall
Nontranscribable on stereo transcribable on mono	17	18	21	56
Nontranscribable on mono transcribable on stereo	2	3	4	9
Disagreements transcribable in both stereo and mono	23	10	7	40
Disagreements between stereo and monoaural transcriptions	42	31	32	105

The transcribable disagreements for (th) occur mainly with instances of voiced th. Only two instances of voiceless th occur among the transcribable disagreements for (th). One of these is a case which was ambiguously coded as either a fricative [θ] or an affricate [tθ] on the stereo tape and was clearly heard as a fricative [θ] on the monoaural tape. The other instance was coded ambiguously as either a fricative [θ] or an affricate [tθ] on the stereo tape and coded ambiguously as either a stop [t] or an affricate [tθ] on the monoaural tape. These two instances reflect a perceived ambiguity on the stereo recording the first of which is resolved from the monoaural recording and the second of which is also perceived ambiguously. The voiced instances of the transcribable disagreements of (th) are charted in Table 3.

TABLE 3

VOICED INSTANCES OF TRANSCRIBABLE DISAGREEMENTS OF (th)[4]

		Monoaural Transcription				
		ð	dð	d	ð or dð	dð or d
Stereo Transcription	ð	(18)	3	1	3	0
	dð	2	(13)	2	2	0
	d	0	0	(3)	1	0
	ð or dð	2	2	1	(9)	0
	dð or d	0	1	1	0	(0)

[4]Items in parentheses constitute points of agreement and are included for the sake of completeness.

Assuming that the stereo transcriptions are correct these data weakly suggest that monoaural recordings obscure fricatives, causing a smaller proportion of [ð] and [dð] to be transcribed than is justified. Conversely, assuming that the monoaural transcriptions are correct, these data suggest that stereo recordings lead to a somewhat smaller proportion of [dð] and [d] being transcribed than is warranted. For the most part the transcribable disagreements are relatively evenly spread over the class of alternative transcriptions. The effect of such a distribution is to obscure the exact nature of the phenomena being studied; but there is little danger that the overall outlines of the (th) variable could be either completely hidden or hopelessly distorted.

Similarly, the transcribable disagreements of the (KD) and (VD) variables are more or less evenly distributed across the possible transcriptions (see Tables 4 and 5). There is some clustering around items ending in glottal stop [ʔ], but this is a frequent form, so that the relative rate of disagreement is in every case close to that of the relevant variable.

TABLE 4

TRANSCRIBABLE DISAGREEMENTS OF (KD)[5]

		Monoaural Transcription			
		Kt	Kʔ	KØ	KD
Stero Transcription	Kt	(4)	0	0	0
	Kʔ	0	(17)	4	1
	KØ	0	1	(23)	1
	KD	0	1	2	(4)

[5]Items in parentheses constitute points of agreement and are included for the sake of completeness.

TABLE 5

TRANSCRIBABLE DISAGREEMENTS OF (VD)[6]

Stero Transcription	Monoaural Transcription: D	d	t	?	Ø
D	(9)	0	1	1	0
d	0	(1)	0	0	0
t	0	0	(2)	0	0
?	2	0	1	(29)	2
Ø	0	0	0	0	(2)

Thus it is apparent that the disagreements between the two recording-playback systems are primarily due to a greater lack of clarity of stereo recordings when recording children in groups of five and six. This finding is corroborated by typists who have transcribed the same material from both stereo and monoaural recordings. They report that the monoaural recordings are simply easier to hear. The linguist who did the transcriptions shares this reaction. It should be noted, however, that these problems with stereo recordings would probably be greatly ameliorated by reducing the number of speakers talking at one time.

The possibility remains that some of the transcription discrepancies are due to inherent limitations of the recording equipment.

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[6]Items in parentheness constitute points of agreement and are included for the sake of completeness.

For instance, one instance of a final [f] was transcribed as such from the stereo tape but transcribed as a final [θ] from the monoaural tape. When the speaker was observed on the video tape the occurrence of the [f] was confirmed. Whether or not this is a general phenomenon with final [f] cannot be stated. It is possible that the placement of the lavaliere microphone behind the speaker's mouth entails obscuring the difference between [f] and [θ], whereas the stereo recordings do not suffer from this constraint. It would be well to keep such potential limitations in mind when planning a study.

Discussion

Three questions were addressed in the current study:

1. Does the visibility or proximity of microphones affect the speech production of elementary school children?
2. Are stereophonic recordings made from desk or wall mounted microphones as useable for the purposes of linguistic analysis as monoaural recordings made from lavaliere microphones?
3. Do different ethnic groups react differently to the recording situation?

For purposes of collecting casual speech from children in groups of five or six the answer to all three questions appears to be "no."

Microphone visibility clearly has an important effect on the content of children's speech but appears not to have much effect, if any, on the form of the speech. Nevertheless in order to provide a less aversive recording context it might be wise to provide a task for the children to do which allows and encourages informal speech.

Stereophonic recordings, while allowing a more flexible recording situation, do not provide as much useable information per unit of time as monoaural recordings when working with groups of five or larger. The possibility exists, however, that for some linguistic information microphones placed in front of the mouth may provide higher quality data than lavaliere microphones.

There is no reason to believe that the ethnic groups studied react differentially to the recording situation.

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